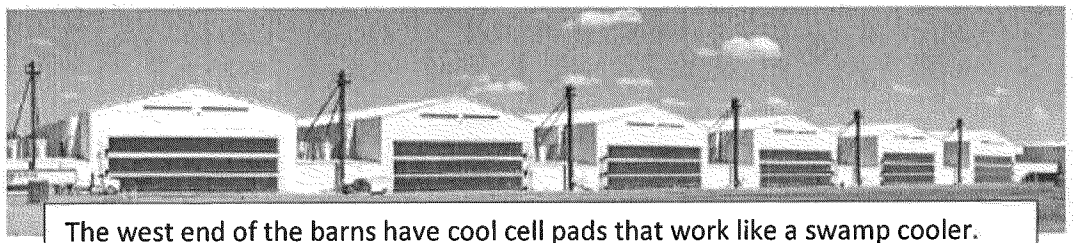
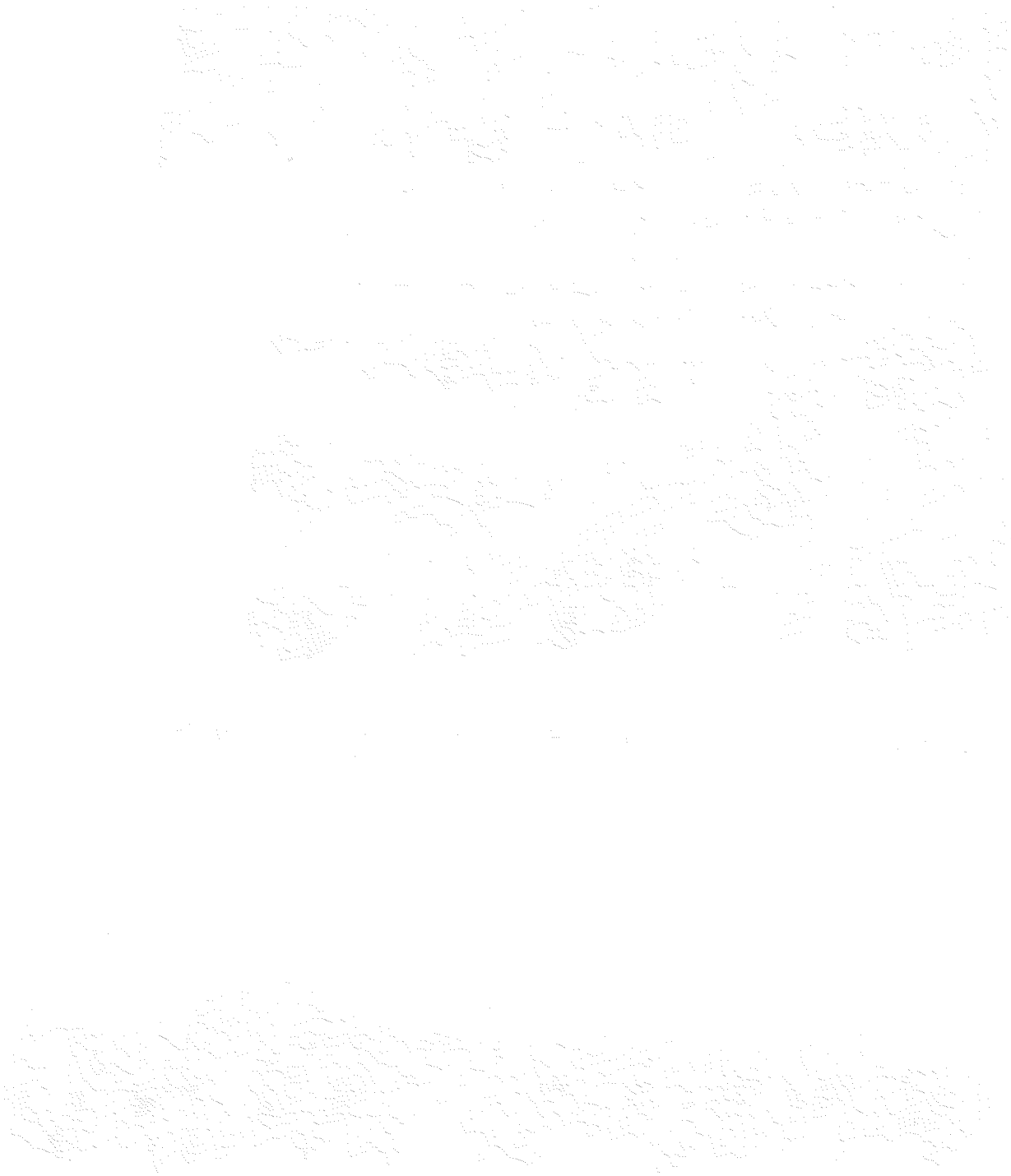


The west end of the barns have cool cell pads that work like a swamp cooler. The intake air pulls in from this side of the barn.

The east end of the barn has exhaust fans that pull the air through the house keeping the air flow positive in the house.

Tonopah Farm – This picture is of the Manure Drying Barns with curtains to ensure that the manure is dryed by the exaust air from the layer barns reducing emissions and smell associated with wet manure.

All 10 houses have the manure shed screens added to reduce dander from escaping the drying barn when manure belts are running.



HICKMAN'S family farms

Barn Fan Stage Sequence for Cooling

On the Old houses (Arlington south 1-12, Arlington North 13-26, Pullets A – G, Maricopa 1-5)

Fan Stages:

The fans stages are determined by TMT (Temperature to Maintain) what the set point is set at. Then a timer in the PLC waits for a period of time (set by the barn manager) which is usually 30 seconds. The Logic tries to tune to .3 of a degree to maintain temperature.

Pulse time:

The Pulse timer is set by the Barn Manager and us usually set for 30 minutes. This will add a additional stages set by the Barn manager, this is usually set to 2. This feature allows the fan to increase the air exchanges in the house for the environment comfort.

House Temperature control

The RTD's (Temperature transmitters) in the House are spread across 12 or more areas in the house as zones. The PLC looks at all the RTD's and does an average which then is calculated for the TMT logic. If a RTD Fails it is programmed on a alarm and the TMT for that one RTD is set for 77 DEG so the Average is not compromised.

Outside Temperature limits

A new feature added to the system is to limit the number of fan stages during cooler temperatures. This feature "Clamps" or limits the number of stages that can run while cooler temperatures are present. This also is set by the barn manager for animal comfort.

On the Newer houses (Tonopah 1-10, Maricopa 6-7, pullets H – J)

Fan stage

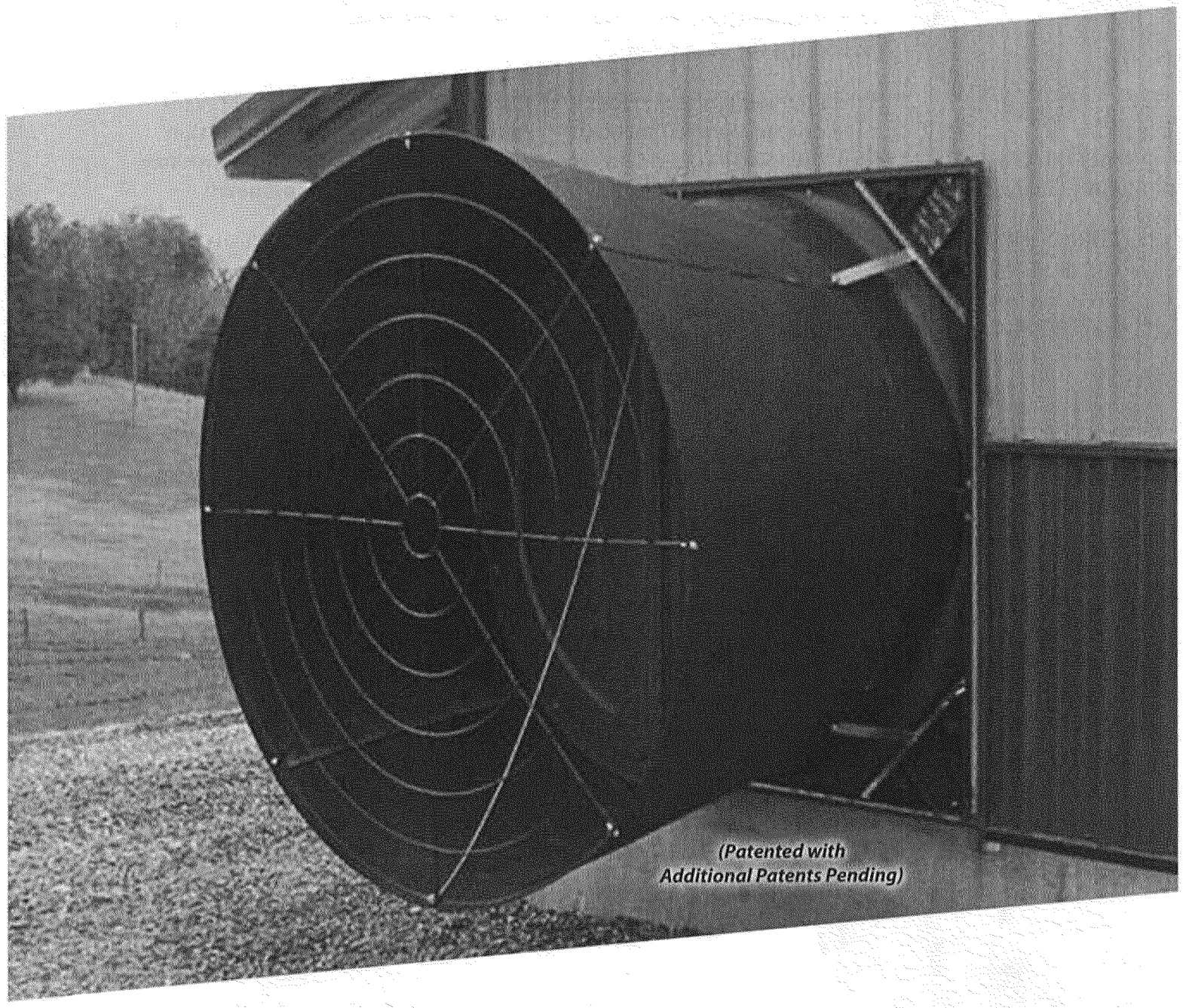
The Fan Stage are much the same setup as above except they use a PID loop which holds a closer Set point to the TMT temperature

**** See pictures of airflow and fan specifications from manufacturer, to further explain the Process streams for air flow. ****

Chore-Time® Fan Guide
For Tunnel and Other Applications

CHORE-TIME®

Our Experience.
Your Success.



Chore-Time's Composite, Fiberglass and Galvanized Fans Provide Efficiency and Performance

Diameters available through 57 Inches (145 cm)

» Durable composite shroud and HYFLO® Shutter Doors contain fiberglass made of long fibers for greater strength.

» Chore-Time's TURBO® Fiberglass Fans feature a sturdy, reinforced-fiberglass housing with heavy cast-aluminum blade and corrosion-resistant components.

Chore-Time Ventilation Fans

When you grow with Chore-Time, you get the ventilation products you need to keep your birds healthy and productive. Chore-Time's Fans are put through rigorous testing at our on-site wind tunnel and rated by BESS Labs for performance.

Whether you move more air with Chore-Time's HYFLO® shutter (available on fans up to 57 inches/145 cm) or replace minimum ventilation fans with Chore-Time's efficient variable speed fans, you can optimize your air moving efficiency with the latest innovations from Chore-Time. Choose from these top-performing models:

- » TURBO® Fiberglass Tunnel Fans
- » CHORE-TIME® Galvanized Tunnel Fans
- » 57-Inch Outside-Mount Tunnel Fans
- » HYFLO® Shutters for Tunnel Fans
- » Energy-Efficient Variable Speed Fans
- » Box, Panel and Basket Fans For Supplemental Air Circulation

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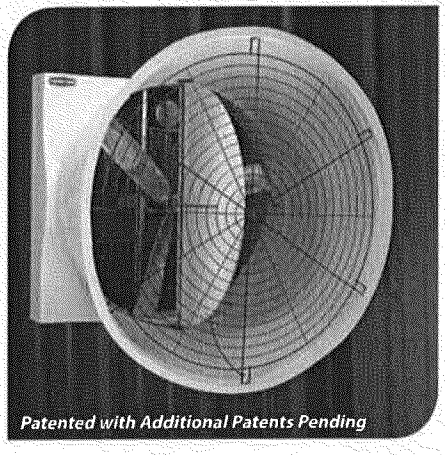
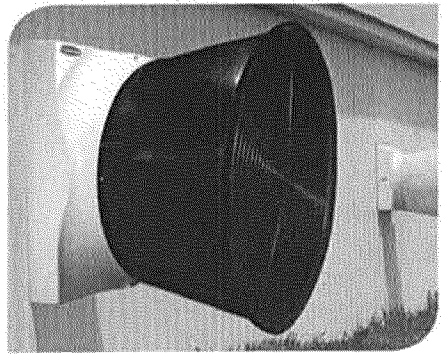


Add Chore-Time's HYFLO® Shutter for even greater efficiency.



Users may choose black or white for housing interior and cone. Housing exterior is white.

TURBO® Fiberglass Tunnel Fans

Available in 52- and 48-inch Models (132.1- and 121.9-cm)

- » Sturdy, corrosion-resistant fiberglass housing with heavy cast-aluminum blade, aluminum motor mounts and corrosion-resistant components.
- » Motors are selected for each fan model to optimize its performance efficiency. Extensive motor testing is completed in our on-site wind tunnel under various operating conditions.
- » One-piece, impact-resistant, polyethylene cone.
- » Automatic belt tensioner uses arm and pulley arrangement to provide consistent belt tension.
- » Heavy-duty, cast iron, air-handler type bearings are self-aligning, pre-lubricated, and include a zerk fitting, as well as being shielded from moisture and dust.
- » Fans are shipped fully assembled including shutter doors. At installation, simply attach fan to house sidewall, add one-piece cone, and snap grill in place. Unit installs flush on inside of house.
- » Backed by Chore-Time's generous extended warranty including limited lifetime coverage for housing and blade, three years on shutter and cone, and two years on motor

Chore-Time® Galvanized Tunnel Fans

CHORE-TIME®

Our Experience. Your Success.

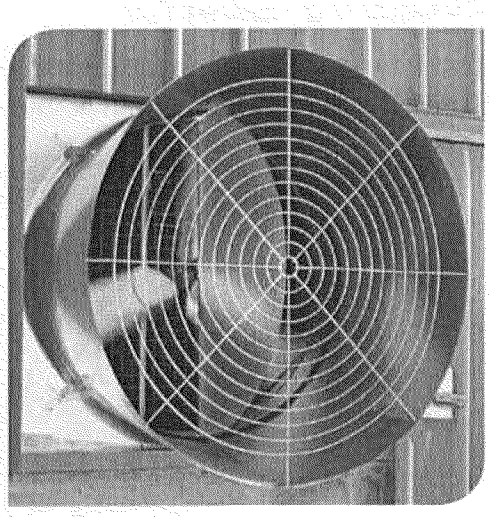
Available in 54-, 52- and 48-inch Models (137.2-, 132.1- and 121.9-cm)

» Factory-assembled using rugged, galvanized steel panels with screw fasteners and a galvanized steel blade.

» Chore-Time specifically selects the motor for each fan model to optimize its performance efficiency. Motors are then extensively tested in our on-site wind tunnel under various operating conditions.

» Automatic belt tensioning system uses an idler arm and pulley to maintain constant optimum belt tension on the fan's easy-to-change belt.

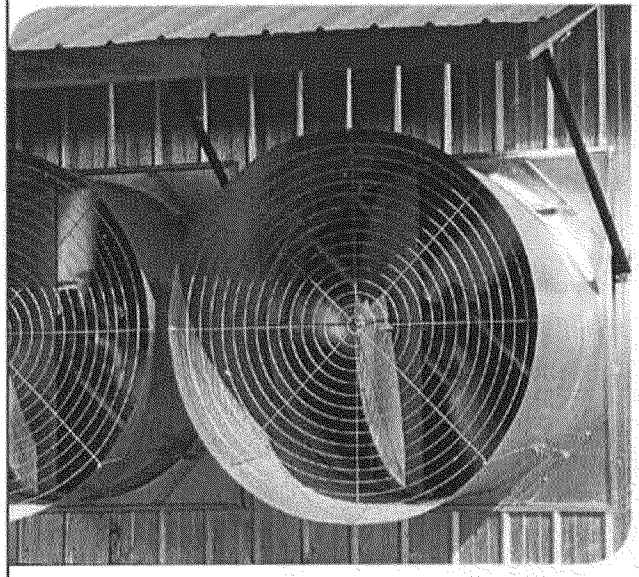
» Heavy-duty, cast iron, air-handler type bearings are self-aligning, pre-lubricated, and include a zerk fitting, as well as being shielded from moisture and dust.



Chore-Time's HYFLO® Shutter improves fan performance by minimizing obstructions during fan operation.

54-Inch (137.2-cm) Outside-Mount Galvanized Tunnel Fans

Designed for more airflow or fewer fans with faster, more convenient installation



Get More Airflow and Easy Installation with Retrofit Applications

Easily replace older, inefficient 48-inch fans and get 30-35% more airflow.

» For replacement applications, mount to rough openings from most existing 48-inch through 54-inch fans.

» No need to reframe sidewalls or update wiring before installation in many cases.

Fewer Fans for New Construction

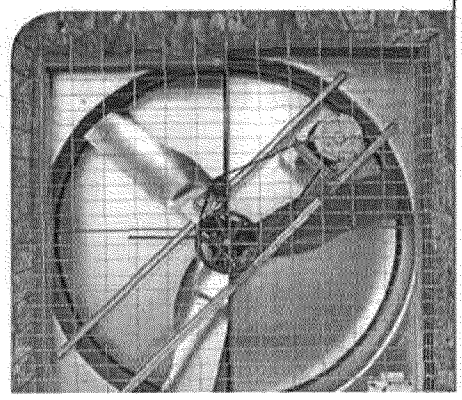
Mounts to the outside of the framed opening, using same sidewall opening as a 52-inch fan.

» Can be installed on 5-foot (1.5-m) centers.

» Tighter seal limits light and air leakage.

» Quieter operation.

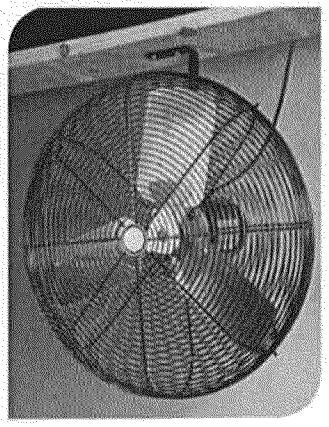
Chore-Time's 54-inch Fan can be mounted using existing 48-inch (shown in red) or 52-inch (shown in blue) framing. This eliminates the need to reframe sidewalls for retrofit applications.



Air Circulating Fans, Louvers and Fan Accessories

Air Circulating Basket Fan

» Mixes air for more even house temperatures.
» 1/10 or 1/2 horsepower direct drive motor.
» Sealed ball bearings.
» Automatic thermal overload protection.
» Polyvinyl-coated heavy-duty guard for superior corrosion resistance.
» "L"-shaped ceiling mount bracket provided with fan.



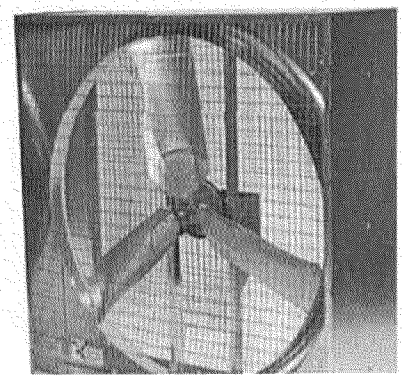
20-Inch (508-mm) Diameter Basket Fan with Ceiling Mount Bracket

Basket Fan Specifications Chart			
Part No.	Diameter	Motor	Electricity
51702	20 inches (508 mm)	1/10 HP 1725 RPM	115/230V 1 Phase
50576-230	24 inches (610 mm)	1/2 HP 1725 RPM	230V 1 Phase

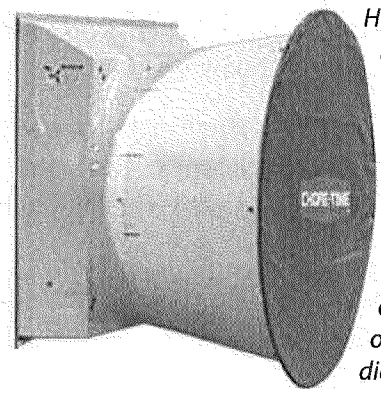
Box and Panel Fans

Box fans are available in 24-, 36- and 48-inch diameters with metal framing in direct-drive. Wood framing is available for the 24- and 36-inch fans. Belt-drive is available for the 36- and 48-inch fans.

Panel fans are available without framing in 36- and 48-inch diameters in belt- or direct-drive.



Cone Covers

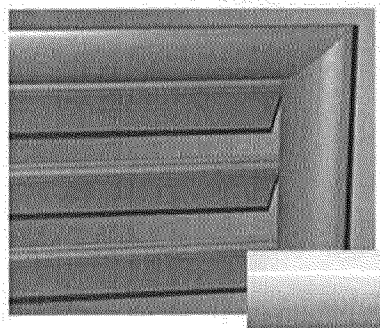


HELP SEAL OUT DRAFTS during cold weather with optional cone covers made of vinyl-coated, ultraviolet-resistant fabric. Available in 53- or 64-inch (134 or 162 cm) outside diameters.

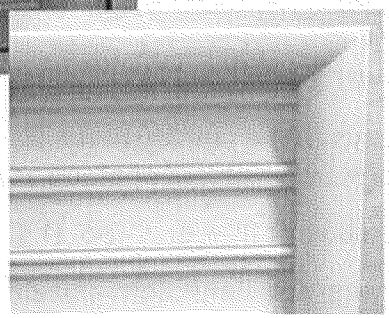
Louver Shutters

Chore-Time's Louver Shutters come in an aerodynamic "belled" style frame for greater efficiency as well as in a flat frame model for flush mounting. Available in white or gray.

» Louvers' flexible edge helps seal the fan's opening when fan is at rest.
» Corrosion-proof vinyl construction with a rigid vinyl frame and fiberglass rod hinges for the louvers.
» Louvers are easy to replace and have a smooth, easy-care finish for low maintenance.



Flexible louver edge helps seal the fan's opening.



Belled shutter has a curved,

Fan Selection and Maintenance Recommendations

CHORE-TIME®

Our Experience. Your Success.

The materials from which today's poultry house equipment is made have not changed, but the poultry house environment has. Proper equipment selection and maintenance has never been more important.

Poultry houses tend to have more moisture, ammonia and chemicals than in years past.

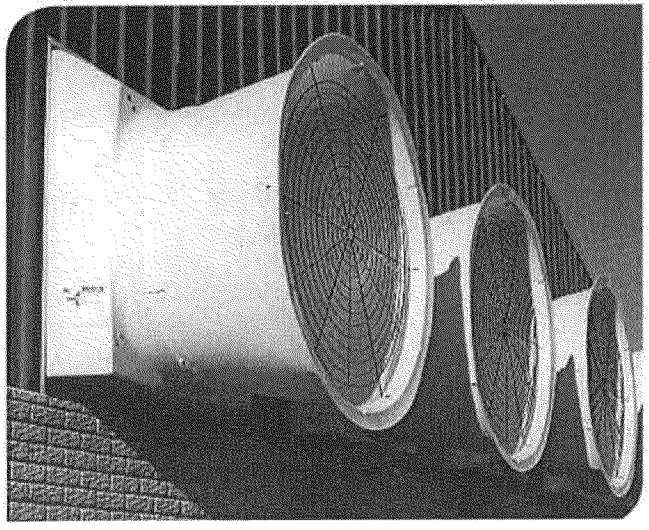
» Houses are more air tight.
» Rising fuel costs lead to underventilation.
» Advanced litter treatments permit more dampness and ammonia on floors.

Without curtains, all moisture must be removed by power ventilation.

» Using tunnel fans to exhaust air from the brood chamber introduces hot humid air in the grow-out area.
» Increased amounts of ammonia exhausted through fans can cause extensive damage.

During cool weather, the combination of hot humid air and cold surfaces can lead to condensation.

» Condensation on galvanized metal can result in corrosion and serious damage.
» The problem of corrosive chemicals in the house is compounded if chemicals are allowed to come into contact with wet equipment.



Best Practices for Bird Health and Equipment Life

Reduce Moisture in the House

» Follow minimum ventilation standards based on birds' age.
» Maintain relative humidity in the house below 70%.

Limit the Effects of Corrosive Elements

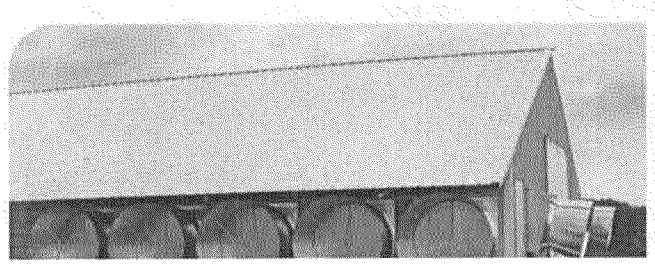
» Maintain fans properly.
» Remove surface dust and dirt from fans between flocks.
» When cleaning fans, don't leave standing water on metal surfaces.
» Avoid direct contact of chemicals with equipment.

Choose Fans Wisely

» Consider whether the fan is made of heavy-duty, corrosion-resistant materials.
» Evaluate the warranty and the company behind it.
» Contrast the fan's performance and energy usage with its cost and life expectancy.

Fan Selection Comparison

Chore-Time® Fans	52-Inch Fiberglass	52-Inch Galvanized	54-Inch Galvanized
M^3/Hr	Better	Good	Best
$M^3/Hr/Watt$	Better	Good	Best
Life Expectancy	Best	Good	Good
Warranty	Best	Good	Good
Price	Higher	Lowest	Lower

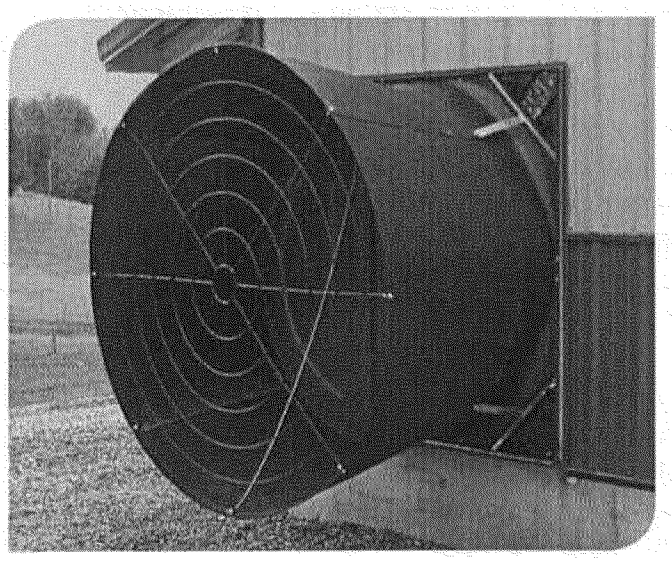


Chore-Time® Fans

ENDURA® High-Performance, Corrosion-Resistant 57-Inch (145-cm) Fans

Fan Performance

Thanks to its high output capacity, *impressive energy* efficiency *and* superior *materials,*
Chore-Time's ENDURA® Fan may just be the best tunnel fan available on the market!



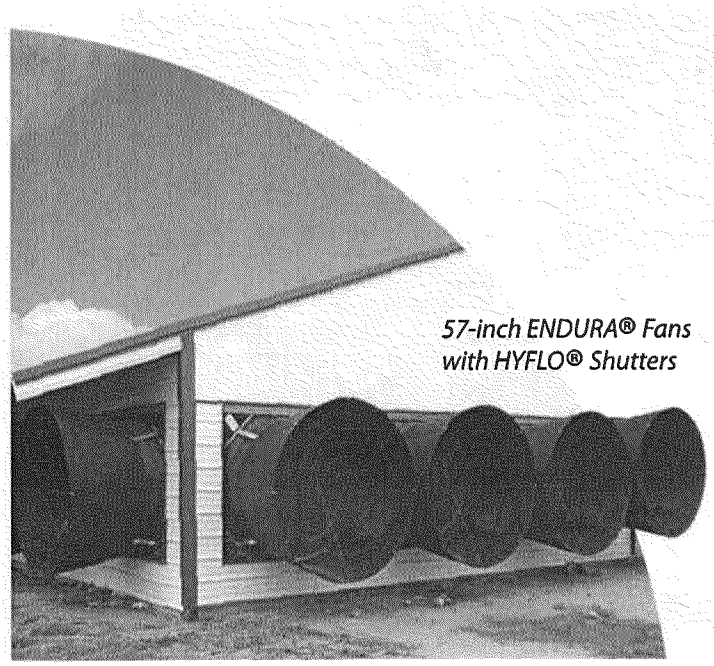
Chore-Time's 57-inch (145-cm) ENDURA® Fan with HYFLO® Shutter features an industry-leading combination of outstanding performance and strategic material selection.

Fan and Shutter Performance

» The ENDURA® Fan's high airflow and efficiency move a lot of air while saving energy.

» Chore-Time's HYFLO® Shutters do not suffer the typical 12-15% loss of efficiency and air speed typical of dirty louver-style shutters, so air speed is maintained to the end of the flock, when you need it most.

» HYFLO® Shutters improve fan performance by minimizing obstructions during fan operation. They deliver up to 10% more air than traditional shutters with 75% less opportunity for air to leak through.



57-inch ENDURA® Fans with HYFLO® Shutters

Exceptional Materials

» Durable composite shroud and HYFLO® Shutter Doors contain fiberglass made of long fibers for greater strength.

» Extensive durability testing under both extreme high and extreme low temperatures.

Adaptability

» Can be installed 60 inches (152.4 cm) on center over 56.5-inch (143.5-cm) framed openings.

» For retrofit, will fit over openings for many 48- through 54-inch (121.9- through 137.2-cm) fans.

» Black HDPE (high-density polyethylene) cone aids in light control.

» Capable of variable speed operation with the use of a variable frequency drive.

Durability

» Automatic belt tensioner uses an idler arm and pulley to provide constant belt tension.

» Rugged air-handler bearings are shielded from dust and moisture, self-aligning, prelubricated and include a zerk fitting.

CHORE-TIME

Our Experience.
Your Success.

54-Inch Chore-Time® Galvanized Steel Fan Specifications

54-Inch (137-cm) Metal Fan		.05 Static Pressure (12 Pa)		.10 Static Pressure (25 Pa)		.15 Static Pressure (37 Pa)		Air Flow Ratio	Electricity Volts/Hz/Ph*	Bess Labs Test No.
Type	Fan P/N	CFM (Pa)	CFM/Watt (M^3/Hr/W)	CFM (Pa)	CFM/Watt (M^3/Hr/W)	CFM (Pa)	CFM/Watt (M^3/Hr/W)			
Energy-Efficient	52157-52	27,100 (46,000)	25.7 (43.7)	25,200 (42,800)	22.2 (37.7)	23,200 (39,400)	19.5 (33.1)	.77	230/50/3	09085
Energy-Efficient	52157-42	27,500 (46,700)	25.6 (43.5)	25,500 (43,300)	22.1 (37.6)	23,600 (40,100)	19.4 (33.0)	.78	230/60/3	09082

**Three-phase fans can be operated using 230/400-volt 50-Hz or 230/460-volt 60 Hz output.*

57-Inch ENDURA® Fan Specifications

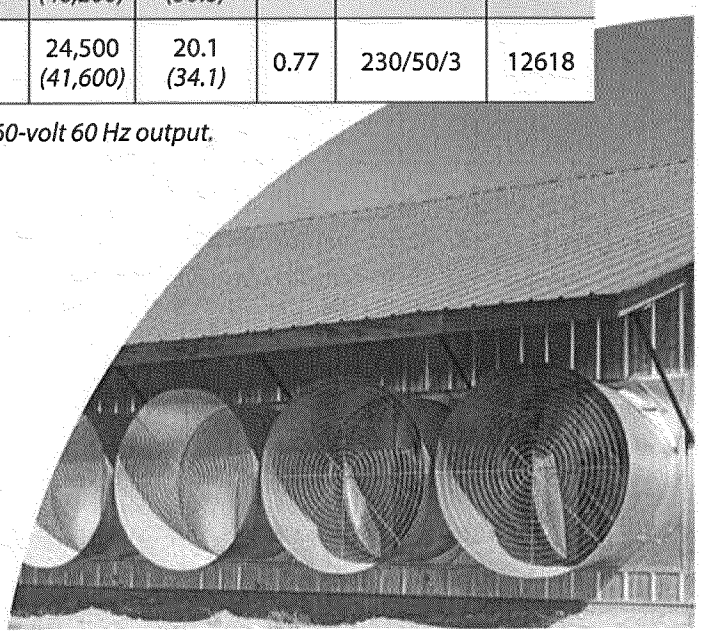
Composite Shroud and HYFLO® Shutter Doors with High-Density Polyethylene (HDPE) Cone

57-Inch (145-cm) ENDURA® Fan		.05 Static Pressure (12 Pa)		.10 Static Pressure (25 Pa)		.15 Static Pressure (37 Pa)		Air Flow Ratio	Electricity Volts/Hz/Ph*	Bess Labs Test No.
Type	Fan P/N	CFM (Pa)	CFM/Watt (M^3/Hr/W)	CFM (Pa)	CFM/Watt (M^3/Hr/W)	CFM (Pa)	CFM/Watt (M^3/Hr/W)			
High-Capacity	53464-41	31,900 (54,300)	23.6 (40.2)	30,000 (51,100)	20.9 (35.6)	27,800 (47,200)	18.1 (30.8)	0.79	230/60/3	12616
Energy-Efficient	53464-42	28,700 (48,700)	26.5 (45.1)	26,900 (45,600)	23.3 (39.6)	24,800 (42,200)	20.4 (34.6)	0.78	230/60/3	12619
High-Capacity	53464-51	31,400 (53,300)	23.4 (39.7)	29,500 (50,100)	20.8 (35.3)	27,200 (46,200)	18.1 (30.8)	0.78	230/50/3	12617
Energy-Efficient	53464-52	28,500 (48,500)	26.1 (44.3)	26,500 (45,100)	22.9 (38.9)	24,500 (41,600)	20.1 (34.1)	0.77	230/50/3	12618

**Three-phase fans can be operated using 230/400-volt 50-Hz or 230/460-volt 60 Hz output.*

54- and 57-Inch Fan Comparison

CHORE-TIME® Fans	54-Inch Galvanized	57-Inch Composite
M^3/Hr	Good	**Best**
M^3/Hr/Watt	Good	**Best**
Life Expectancy	Good	**Best**
Light Control	Good	**Best**



Tunnel Fan Specifications (50 Hz 3 Phase)

Fans are arranged in descending order by fan capacity at 25 Pascal.
Chore-Time recommends considering both capacity (M^3/H) and (M^3/Watt) when selecting a fan.

							12,5 Pa		25 Pa	
Size	Mat.	Style	Shutter	Drive	Type	Fan P/N	M^3/H	M^3/Watt	M^3/H	M^3/Watt
57 inch 145 cm	HDPE	C	HYCAP	BD	High-Cap.	53464-51	53300	39.7	50100	35.3
54 inch 137.2 cm	G	C	HYFLO	BD	High-Cap.	52157-51	52329/ 43608	26.75	49101	30.34
54 inch 137.2 cm	G	C	HYFLO	BD	Energy-Eff	52157-51	47062	23.26	43834	26.75
52 inch 132.1 cm	F	C	HYFLO	BD	High-Cap.	49740-51	50460	28.71	47062	32.16
52 inch 132.1 cm	G	C	HYFLO	BD	High-Cap.	49511-51	49441	29.04	46383	32.69
52 inch 132.1 cm	G	C	HYFLO	BD	High-Cap.	49519-51	49441	29.04	46383	32.69
52 inch 132.1 cm	G	SW-C	BELL Louver	BD	High-Cap.	48319-515	47232	31.47	44684	34.42
52 inch 132.1 cm	F	C	HYFLO	BD	Energy-Eff	49740-51	45873	25.05	42305	28.3
52 inch 132.1 cm	G	C	HYFLO	BD	Energy-Eff	49519-51	44854	24.94	41625	28.3
52 inch 132.1 cm	G	SW-C	BELL Louver	BD	Energy-Eff	48319-515	42305	27.25	39587	30.34
48 inch 121.9 cm	F	C	BELL Louver	BD	High-Cap.	47898-4855	44854	32.69	42475	36.11
48 inch 121.9 cm	G	SW-C	BELL Louver	BD	High-Cap.	48318-512	41456	28.99	38907	32.69
48 inch 121.9 cm	G	C	HYFLO	BD	High-Cap.	49515-51	41795	28.3	38567	32.69
48 inch 121.9 cm	F	C	BELL Louver	BD	Energy-Eff	38264-4852	40096	27.76	37548	30.98
48 inch 121.9 cm	G	C	HYFLO	BD	Energy-Eff	49515-51	35849	24.12	33300	27.63
48 inch 121.9 cm	G	SW-C	BELL Louver	BD	Energy-Eff	48318-512	35169	25.36	32621	29.14

Tunnel Fan Specifications (50 Hz 3 Phase)

Fans are arranged in descending order by fan capacity at 25 Pascal.
Chore-Time recommends considering both capacity (M^3/H) and (M^3/Watt) when selecting a fan.

						12,5 Pa		25 Pa	
Size	Mat.	Style	Shutter	Drive	Fan P/N	M^3/H	M^3/Watt	M^3/H	M^3/Watt
36 inch 91.4 cm	F	C	Flat Louver	BD	38589-3652	20320	30.98	19012	34.62
36 inch 91.4 cm	G.	SW-C	Flat Louver	BD	46130-3652	18740	33.07	17330	37.97
36 inch 91.4 cm	F	C	Flat Louver	DD	38265-3652	18638	31.64	17330	35.03
36 inch 91.4 cm	G.	CW-C	Flat Louver	DD	44860-3652	17346	32.88	16072	37.02
36 inch 91.4 cm	G.	C	HYFLO	DD	50372-51	16786	27.38	15563	31.14
24 inch 61.0 cm	F	C	Flat Louver	DD	40452-2452	10170	36.33	9429	39.24

KEY: Mat.=Material; G=Galvanized; F=Fiberglass; C=Cone; SW-C=Slantwall Cone; BD=Belt-Drive; DD=Direct-Drive

Avariable frequency drive option is available for the following 3-phase fans; 52 inch fiberglass energy-efficient; high-capacity fans; 48-inch fiberglass energy-efficient fan with special motor; and 54-inch and 52-inch galvanized energy-efficient fans.

This is a sampling of the many fan sizes, models and configurations that Chore-Time offers. Additional electrical specifications also available. Contact your certified distributor for details on any fans not shown here.

Find your nearest distributor in our on-line distributor finder.

www.ctbworld.com

Chore-Time Europe B.V.
Nederweerterdijk 4
5768 PH Meijel - The Netherlands
Tel. +31 (0)77-324 1070

Chore-Time Europe Sp zo.o.
ul. Poznańska 1
62-060 Strykowo - Poland
Tel. +48-(0)61-819 7060

University of Illinois Department of Agricultural Engineering
BESS Lab

Project Number: 04327

Test Date: November 4, 2004

Fan

Make: Chore-Time

Model #: 49515-21

Manufacturer: CTB Inc.

Blade Size: 48" dia.

Orifice Dia.: 48.5"

Blade

Number: 3

Shape: propeller

Material: galvanized steel

Pitch: -

Clearance: 0.3"

Shutter - Butterfly Damper 49.5" dia.

Material: galvanized steel

# of Doors: 2

# of Columns: -

Door Length: -

Location: exhaust

Other Attachments:

Discharge cone 33" deep, 48.5" i.d., 59" o.d.

Motor

Make: GE

Model #: 5KCR48WN0711T

Phase: *1*

H.P.: 1.5

Amps: 6.5/6.6

Volts: 208-230

RPM: 1725

S.F.: 1.10

Drive

Drive Pulley Dia. *3.0"o.d.* AK30

Axle Pulley Dia.: 9.3" o.d. AK94

Housing

Material: galvanized steel

Intake Area: 54" x 54"

Discharge Area: 48.5" dia.

Depth: 26"

Guards

Description: wire

Spacing: 2"x4" intake
2" concentric - exhaust

Location: intake/exhaust

TEST RESULTS

CHORE-TIME 49515-21
Test: 04327

Fan description:
48" belt drive, 1.5 hp GE 5KCR48WN0711T motor, galvanized steel housing, steel butterfly damper, guards (intake/exhaust) and discharge cone

Static Pressure in. water	Speed rpm	Airflow cfm	Efficiency cfm/Watt
0.00	553	26,200	23.4
0.05	552	24,600	20.8
0.10	550	22,700	18.0
0.15	549	20,700	15.8
0.20	548	18,800	13.5
0.25	546	16,800	11.6
0.30	545	14,000	9.3